

DOCUMENT RESUME

ED 470 817

IR 021 841

AUTHOR Crawford, Caroline M.; Brown, Evelyn; Chilelli, Chris
TITLE Mathematical Treats Form the Stars: Integrating Curricular Elements through Partnerships between NASA and Math Methods Faculty.
PUB DATE 2002-03-00
NOTE 8p.; Paper presented at the International Conference of the Society for Information Technology & Teacher Education (13th, Nashville, TN, March 18-23, 2002).
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS *Educational Resources; Elementary Secondary Education; Higher Education; Instructional Innovation; *Instructional Materials; *Mathematics Education; *Mathematics Materials; *Partnerships in Education
IDENTIFIERS *Mathematics Methods Program; *National Aeronautics and Space Administration

ABSTRACT

Mathematics methods coursework can be an innovative environment through which to emphasize the integration of real-world data structures and opportunities. These opportunities can create instructionally informative opportunities for learners, as well as inform teacher candidates of innovative teaching tools at their fingertips. NASA offers numerous curricular opportunities to the mathematical methods coursework, with work focusing on both PreK-12 learners as well as university learners. Such a wide array of interest levels integrate numerous learning objectives, depending upon the needs and desires of the instructors and learners whom they serve. This paper focuses on the innovative opportunities that the NASA educational entity offers to the PreK-12 as well as university mathematical methods courses. Examples are presented in links to several Web sites, which are developed by and in collaboration with scientists, engineers, educators, instructional designers, and other professionals; the sole intent of these endeavors is the support of education pertaining to the emphasis of mathematics and cross-curricular, real-world support in PreK-12 educational environments. (Author/AEF)

Title: Mathematical Treats form the Stars: Integrating Curricular Elements Through Partnerships Between NASA and Math Methods Faculty

Author: Caroline M. Crawford
University of Houston – Clear Lake
Houston, Texas, USA
crawford@cl.uh.edu

Evelyn Brown

University of Houston-Downtown

United States of America

BrownE@zeus.dtu.edu

Chris Chilelli

NASA Johnson Space Center

United States of America

chris.chilelli1@jsc.nasa.gov

Note:

This manuscript was previously published in SITE2002's proceedings. Following is the reference:

Crawford, C., Brown, E., & Chilelli, C. (2002). Mathematical treats from the stars: Integrating curricular elements through partnerships between NASA and math methods faculty. In D. A. Willis, J. D. Price & N. Davis (Eds.), *Proceedings of SITE 2002 Annual - Society for Information Technology and Teacher Education* (1054-1055). Norfolk, VA: Association for the Advancement of Computing in Education (AACE).

PERMISSION TO REPRODUCE AND
DISSEMINATE THIS MATERIAL HAS
BEEN GRANTED BY

C.M. Crawford

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

This document has been reproduced as
received from the person or organization
originating it.

Minor changes have been made to
improve reproduction quality.

Points of view or opinions stated in this
document do not necessarily represent
official OERI position or policy.

BEST COPY AVAILABLE

2

**Mathematical Treats form the Stars: Integrating Curricular Elements Through
Partnerships Between NASA and Math Methods Faculty**

Caroline M. Crawford

University of Houston-Clear Lake

United States of America

crawford@cl.uh.edu

Evelyn Brown

University of Houston-Downtown

United States of America

BrownE@zeus.dt.uh.edu

Chris Chilelli

NASA Johnson Space Center

United States of America

chris.chilelli1@jsc.nasa.gov

Abstract: Mathematics methods coursework can be an innovative environment through which to emphasize the integration of real-world data structures and opportunities. These opportunities can create instructionally informative opportunities for learners, as well as inform

teacher candidates of innovative teaching tools at their fingertips. NASA offers numerous curricular opportunities to the mathematical methods coursework, with work focusing on both PreK-12 learners as well as university learners. Such a wide array of interest levels integrate numerous learning objectives, depending upon the needs and desires of the instructors and learners whom they serve.

Introduction

Teacher candidates with a specialization area focus in mathematics maintain a working knowledge of the learning environment due to their superior university methods faculty; however, the integration of opportunities that will be available within the field are of utmost importance. NASA offers the opportunity to maintain educational excellence through partnerships with PreK-12 instructors. Such partnerships are available through out the United States of America as well as around the world. The focus of this presentation, as well as proceedings paper, will focus upon the innovative opportunities that the NASA educational entity offers to the PreK-12 as well as university mathematical methods courses. The integration of NASA's superior real world curricular abilities into math methods coursework, which offers teacher candidates opportunities to work with real-world data structures and environmental elements that would otherwise be unavailable to the majority of teacher candidates in methods courses, present professional development and learning that will then be integrated into curricular scope and sequence for future PreK-12 learners.

National Standards

The "Technology Principle" is one of six principles that the National Council of Teachers of Mathematics (NCTM) designate as imperative for all teacher candidates to master (NCTM, 2000). The "Technology Principle" states that "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (NCTM, <http://www.nctm.org/standards/principles.htm>, paragraph 28). However, the key to the success of mathematics teaching is the mathematics teachers, not the technological tools that may support the educational endeavors (Garofalo, Drier, Harper, Timmerman & Shockey, 1000; Kaput, 1992; NCTM 1991, 2000). Through the collaboration that can arise between PreK-12 education environments, higher education environments that support teacher candidates and the National Aeronautics and Space Administration (NASA), the possibilities towards supporting and realizing NCTM's "Technology Principle" are available.

NASA Educational World Wide Web Sites

There are numerous Web sites that are supported by distinct arms of NASA. Each of these Web sites delineate the orientation for each NASA campus, such as the following Web sites:

- Practical Uses of Math and Science: The On-line Journal of Math and Science Examples for Pre-College Education
<http://pumas.jpl.nasa.gov/>

- InfoUse's PlaneMath
<http://www.planemath.com/>
- NASA Spacelink
<http://spacelink.nasa.gov/index.html>
- NASA-JSC Distance Learning Outpost
<http://learningoutpost.jsc.nasa.gov/>
- The Space Place
http://spaceplace.jpl.nasa.gov/teachers_page.htm
- NASA Human Space Flight Metric Converter
<http://www.spaceflight.nasa.gov/station/reference/calc/index.html>
- NASA-AMATYC-NSF Mathematics Explorations I and II
<http://cctc.commnet.edu/Ita/>
- NASA KIDS
<http://kids.msfc.nasa.gov/>
- LTP Glenn Learning Technologies Project
<http://www.grc.nasa.gov/WWW/K-12/airplane/index.html>
- Space Science Data Operations Office of NASA/Goddard Space Flight Center: Space Science Education
http://ssdoo.gsfc.nasa.gov/education/education_home.html

The examples presented in the above Web sites are developed by and in collaboration with scientists, engineers, educators, instructional designers, and other professionals. The sole intent of these endeavors being the support of education pertaining to the emphasis of mathematics and cross-curricular, real-world support in PreK-12 educational environments.

Conclusions

As delineated in NCTM's "Connections" section (NCTM, 2000), "Mathematics is an integrated field of study, even though it is often partitioned into separate topics. Students from prekindergarten through grade 12 should see and experience the rich interplay among mathematical topics, between mathematics and other subjects, and between mathematics and their own interests. Viewing mathematics as a whole also helps students learn that mathematics is not a set of isolated skills and arbitrary rules" (NCTM, <http://www.nctm.org/standards/standards.htm>, paragraph 30). NASA has made available interactive workshops, real-world data sets and lesson plans focused upon specific levels of mathematical principles to support the educational endeavors of our education profession, and are to be commended.

References

- Garofalo, J., Drier, H., Harper, S., Timmerman, M.A., & Shockey, T. (2000). Promoting appropriate uses of technology in mathematics teacher preparation. *Contemporary Issues in Technology and Teacher Education* [Online serial], 1(1). Available: <http://www.citejournal.org/vol1/iss1/currentissues/mathematics/article1.htm>
- Kaput, J.J. (1992). Technology and mathematics education. In A.A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 515-556). New York: Macmillan.

National Council of Teachers of Mathematics. (1991). *Professional standards for teaching mathematics*. Reston, VA: Author.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author. Retrieved from the World Wide Web on December 18, 2001:
<http://www.nctm.org/standards/>



U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)



REPRODUCTION RELEASE
(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title:	Mathematical Treats from the Stars: Integrating Curricular Elements Through Partnerships Between NASA and Math Methods Faculty		
Authors:	Caroline M. Crawford, Evelyn Brown, and Chris Chilelli		
Corporate Source:	Association for the Advancement of Computing in Education (AACE)	Publication Date:	2002

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options below and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixed to all Level 2B documents
PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY HAS BEEN GRANTED BY	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
SAMPLE	SAMPLE	SAMPLE
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
Level 1	Level 2A	Level 2B
☒	☐	☐
Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) and paper copy.	Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only.	Check here for Level 2B release, permitting reproduction and dissemination in microfiche only.
Documents will be processed as indicated provided reproduction quality permits.		
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.		

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature:	Printed Name/Position/Title: Dr. Caroline M. Crawford/Assistant Professor	
Organization/Address:	Telephone: 281.587.2930	FAX: 281.283.3563
	E-mail Address: crawford@cl.uh.edu	Date: 06.30.02

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.

Publisher/ Distributor:		
Address:		
Price:		

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:		
Address:		

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:	ERIC Clearinghouse on Information & Technology Syracuse University 621 Skytop Road, Suite 160 Syracuse, NY 13244-5290 E-Mail ericft@ericir.syr.edu 315-443-3640 1-800-464-9107 Fax: 315-443-5448
---	---